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The University of Nebraska

HOME ECONOMICS DEPARTMENT

HOME STUDIES SERIES No. 2

FOOD: A FACTOR IN THE HOME

CEREALS AND HOW TO COOK THEM

FARM CAMPUS

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CONTENTS

LESSON IN BREAD MAKING

Food: a Factor in the Home

By Rosa Bouton

INTRODUCTION

"Wholesome food is a necessity for productive life."—Ellen H. Richards.

Because food is essential to life its selection and preparation are of vital importance. The efficiency of the individual is dependent in a much larger degree than is ordinarily supposed on the quality and quantity of his food. Likewise intellectual and moral power, as well as physical strength are in great measure conditioned by the amount and kind of food taken daily. These things being true, it is advisable for young people to study human nutrition.

Much time and thought have been given to the study of the feeding of animals, but until recently comparatively little attention has been paid to the food problems of the human family. Today, however, people are awakening to the need of investigations concerning food and its assimilation in the human body; they are realizing that balanced rations are quite as necessary for boys and girls as for colts and calves. The work carried on in Experiment Stations and Agricultural Colleges has proved beyond the shadow of a doubt that the judicious feeding of animals greatly increases the profits of stock raising. Consequently, hundreds of young men from the farms are going to agricultural schools to learn how to feed animals so as to make the most money from the capital invested. Moreover, it is claimed by the young men that, after they have received this training, they can make dollars on their farms, where before they made cents. Reasoning from analogy, one is justified in assuming that, since animals thrive so much better when fed in accordance with scientific principles, human beings would correspondingly increase in efficiency if their food were likewise selected and prepared in accordance with the best known methods. Moreover, since the farmer has found that from a money

point of view, it pays to give his son training in cattle-feeding, he will soon learn that it will pay in the increased health and efficiency of his family to give his daughter training in the study of human nutrition.

HOME SCIENCE FOR YOUNG PEOPLE

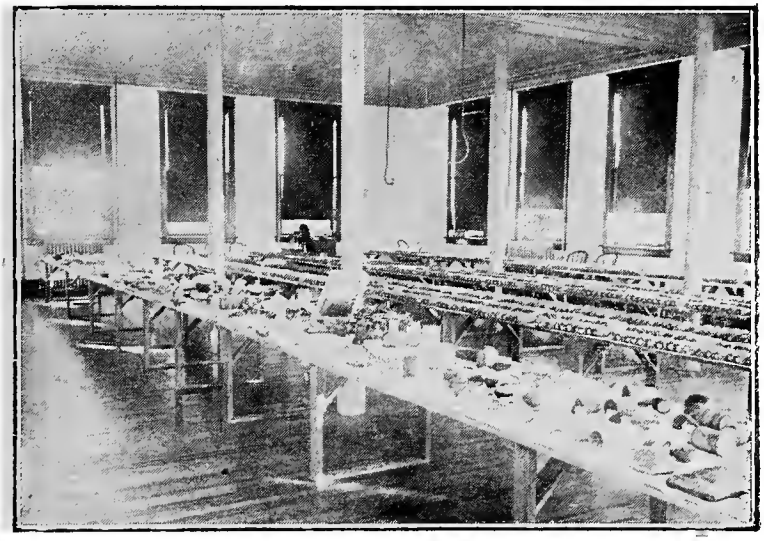
With the introduction of agriculture into the public schools educators are awakening to the need of the study of home science. School men are beginning to realize that, even in an agricultural state like Nebraska, the home is as essential to the well being of the citizens of the commonwealth as the farm. They are coming to understand that it is quite as important that the girls learn to raise bread as that the boys learn to raise corn. Accordingly, with the Boys' Corn-Growing Contest came the Girls' Corn-Cooking Contest. Simultaneously with the Nebraska Boys' Agricultural Association there was formed the Nebraska Girls' Domestic Science Association. Food problems were among the first to attract the attention of the members of these associations. This bulletin is therefore designed to give them helpful suggestions and information concerning their work.

BOYS' AND GIRLS' ASSOCIATIONS

The objects of these associations are: first, to interest young people in home industries; second, to aid them in becoming more intelligent concerning the same; and third, to help them to become more efficient in their work in the home and on the farm.

The exhibition at the last state contest held by the Boys' and Girls' Associations was so large that the managers were convinced that is was impractical to longer continue these state contests in accordance with the original plan. It was therefore decided to encourage county contests and to permit persons receiving high scorings at these contests to enter the state contest which will be held at Lincoln in January at the time of the meetings of organized agriculture. The state organizations are under the combined management of the State Department of Education and the State Farmers' Institutes. The managers are Deputy State Superintendent E. C. Bishop and Val Keyser, Assistant Superintendent of Farmers' Institutes.

The county contests are under the management of the County Superintendents of Public Instruction, cooperating with the state managers. Thirty counties are already organized for this work. Bulletins have been sent out to boys giving information concerning contests and directions for growing corn. This bulletin is issued from the Home Economics Department of the University of Nebraska. It is designed not only to give the girls desired information concerning the contests with helpful suggestions for the same, but also to interest them and their mothers as well, in a practical study of food problems and to aid all in becoming more intelligent concerning the every day work of the home.



CORN COOKING CONTEST

NEBRASKA CORN SONG.

Written for the Nebraska Boys and Girls Associations

Air.—"Marching Through Georgia."

Our home is in Nebraska land
Where skies are bright and clear;
Where sunny days and balmy nights
Play hide and seek all year;
Where cozy homes are scattered in
'Twixt corn fields far and near;
For corn is the King in Nebraska.

Chorus

The Corn; The Corn;
The corn we love so well;
It grows; it grows;
On prairie, hill and dell;
And to all nations of the earth
We raise enough to sell.
For corn is the King in Nebraska.

2.

Our boys are strong and brave and true
And loyal to their state;
They raise the Maize, the Indian corn,
That makes our nation great;
They're husky lads; they're jolly boys;
Prepared for any fate,
While growing big corn in Nebraska.
Chorus.

3.

Our lasses—modest, pure and good,
Have eyes all clear and bright;
Their willing hands and cheerful hearts
Bring comfort and delight;
From corn-bread, clear to Angel's food,
Their cooking is quite right;
For queens are they all in Nebraska.
Chorus.

4.

Our homes,—the best in all the world,
Are happy all day long.
We whistle at our morning's work
And end up with a song.
Ed-u-cation is our pride;
We get it good and strong,
While growing with corn in Nebraska.
Chorus.

E. C. Bishop.

NUTRITIVE VALUE OF FOOD

FOOD PRINCIPLES

"To be well, to be able to do a day's work, is man's birthright. Nevertheless, a too large proportion of the American people sells this most valuable possession for a mess of pottage which pleases the palate for three minutes and weights the digestive organs for three hours."

"The economic and social conditions of daily life have reached such a stage of development as to make a closer study of food materials not only desirable but imperative."

ELLEN H. RICHARDS.

"Food is that which taken into the body either builds tissue or yields energy."—W. O. ATWATER.

There are thousands of different foods but all are practically made up of one or more of five different substances called food principles. Of these, three are designated as nutrients and the the other two, water and mineral matter, as non-nutrients.

WATER

Although water is classed as a non-nutrient, it, nevertheless, serves a very important function in food economy. People are surprised when they begin to learn how large a portion of their food is water. In fresh fruit and vegetables the percentage of water varies from 75 to 90. This is but another way of saying that when one buys a hundred pounds of fruit or vegetables, he pays for from 75 to 90 pounds of water and receives, according to the kind of fruit or vegetable, from 10 to 25 pounds of solid food material. Sirloin steak is more than half water. Even white flour that seems so dry contains from 10 to 12 per cent of water.

Since the human body itself is about two-thirds water, a considerable amount of this substance is required to repair the wear and tear of everyday life and keep the human mechanism in good condition. Water also serves as a carrier to transfer nourishment to the living cells of the body and to carry away the waste matter from all parts of the system.

Ordinarily people do not drink enough water. The average quantity required daily by an adult varies according to conditions of work, temperature, etc., but in general it is about three quarts. Of this a considerable portion is taken in the food. Too little water allows the refuse to accumulate and the bodily drainage system to become clogged.

MINERAL MATTER

This substance is present in larger or smaller amounts in practically all the tissues of the body. The teeth and the bones contain the highest percentages. This mineral matter is composed chiefly of common salt, lime, iron, potassium, phosphorus, and sulphur. According to a wise provision in nature, these same substances are present in most food materials. Fruits and vegetables compared with other foods are rich in mineral matter. This fact suggests one of several reasons why fruit and vegetables should have a place on the bill of fare. In order that the tissues, which are continually wearing away, be repaired, all the elements of which they are composed must be provided in the food supply. The amount of mineral matter required is not large but it is essential. Enough is present in the ordinary food material if fruit and vegetables are freely used. But if these are not furnished, the health is endangered. Sometimes serious illness results from the omission of fruit and vegetables from the daily ration. With children the danger is greater because they need the mineral matter, not only to repair tissue but to build new teeth and bone material as their bodies increase in size. Rickets is a disease of children supposed to be caused by insufficient mineral matter in the food. The teeth and bones do not develop as they should, nervous troubles appear, and sometimes disastrous results follow.

CARBOHYDRATES

The nutrients classed under the general term carbohydrates are familiar to all under the names of starch, sugar and cellular tissue of fruits and vegetables. The word carbohydrate comes from carbon and from hydro, a Greek word meaning water. The substances included in this class were given the name carbohydrates because they are in the main composed of carbon and two other

elements, hydrogen and oxygen, united in the proportion to form water.

These foods serve as fuel in the production of energy, which manifests itself as heat and activity of body and mind.

FATS

The nutrients called fats are well known as butter, lard, tallow, olive oil and cotton seed oil. Yolks of eggs contain about 30 per cent fat which may be extracted as a yellow oil. Nuts are rich in fats, walnuts, (shelled) containing 60 per cent. The cocoa bean from which cocoa and chocolate are made is 50 per cent fat.

Fats are composed of the same elements as the carbohydrates but are more complex in their structure. Like carbohydrates, fats serve as fuel in the production of energy. They are also stored in the different parts of the body as a reserve supply of fuel. In case of need they are utilized as food. When fat accumulates in any considerable quantity either directly under the skin or distributed among the tissues, it acts as a blanket to keep the body warm.

PROTEIDS

The muscle building nutrients are called proteids because they are considered of first importance. The word proteid means first and the name is given to these substances because without them the tissues cannot be built up nor even repaired; hence they are essential to life.

The white of egg, excepting the water, is nearly pure proteid. For this reason, the term albuminous is sometimes applied to this class of nutrients. Lean meat and the clabber of milk, minus the water they contain, are mainly proteid. Peas and beans are relatively rich in these muscle forming substances while most other vegetables are poor in this valuable nutrient. Nuts are so rich in proteids and fats, that they are sometimes used as substitutes for meat. Most grains contain some of these substances, rice being among the poorest in this regard and oatmeal the richest as it sometimes contains as high as 17% of proteid. Gluten, the substance in wheat which makes wheat flour superior to other

flours in the production of light bread, is one of the most interesting forms of proteid .

These nutrients contain all the elements found in the carbohydrates and fats, and in addition another called nitrogen, a gas constituting about four-fifths of the air. For this reason, they are often spoken of as nitrogenous substances. The proteids are the most complex of all the food materials and frequently contain either sulphur or phosphorus, or both.

Their chief function is that of tissue building though in emergencies they may serve as fuel for the production of energy. As they are the most expensive of foods, it is very wasteful to use them for fuel even in the human body, because the fats and carbohydrates serve the purpose much better and cost less.

EFFICIENCY DEPENDENT ON WHOLESOME FOOD

In order that the individual attain the highest degree of efficiency, he must take daily a sufficient amount of good wholesome food, containing the right proportions of these food principles.

One of the most difficult problems to be solved, is to determine just what is a sufficient amount of food and what are the proportions in which these food principles should be supplied, in order that the best results may be secured.

Because of the many varying conditions of age, health, occupation, temperature, etc., it is manifestly impossible to make hard and fast rules concerning these matters. These problems are being carefully studied but as yet scholars refrain from giving definite rules. Nevertheless, much information has been gained which may be applied in such manner as to give valuable results in every day living.

BALANCED RATIONS FOR ANIMALS

The much talked of balanced rations for stock are nothing more nor less than definite amounts of food material containing all the food principles in such proportions as experiments have shown to give the best results in stock feeding. The results to be secured in stock feeding are, increase of milk supply or increase in weight of animal, both of which can be easily determined. It

has been proven beyond question that desired results are secured with less outlay of money when the food principles present in the food stuffs bear certain specified ratios to each other.

BALANCED RATIONS FOR PEOPLE

The problem of human nutrition is, however, much more difficult, because in addition to the physical well-being, there must be considered the development of mental and moral power, all of which are dependent in a very large degree upon the food supply. In spite of the difficulties attendant on this problem, persons who have studied it carefully agree that with people the best results are secured, as with animals, when they are fed on balanced rations. As yet just what the balanced rations are under the varying conditions has not been definitely determined but much has been done and the rations have been calculated approximately.

WHAT CONSTITUTE BALANCED RATIONS

Many helpful suggestions are made for the guidance of those who wish to attain the highest degree of efficiency in their lives. For example, it is said in general that the body of an adult is well nourished if he has per day an amount of digestible proteid equivalent to about $3\frac{1}{2}$ oz. (100 grams) of dry albumen, an equal amount of fat and from three to four times as much carbohydrate with three quarts of water and the mineral matter which he would get incidentally. In considering the above statement, one must remember that these amounts will vary accordingly to many conditions. For example, men ordinarily require more food than women. Those who do manual labor need more nourishment than those who live sedentary lives; those who live in cold climates more fat than those who live in warm countries, etc.

> "It is not necessary for the housekeeper to attempt to estimate the proportion of food principles in every dish she serves, but once a month or a quarter, if her accounts are well kept, she can see how nearly she approaches such daily estimate as the one below for each member of her family."

A DAY'S RATION

	Ounces.
Meat and Fish	12 to 16
One egg	2
Butter	1 to 2
Milk, 1 gill to 1 pint	4 to 16
Sugar	2 to 3
Dry fruits	1
Legumes	1
Fresh vegetables and fruits	6 to 8
Potatoes	8 to 12
Flour and grains	12 to 16

"Multiply this by thirty and we have a fair allowance for one person for one month. Multiply this by the number of persons in the family, or, to be more accurate, by the fractional parts of a man's rations, usually allowed for women and children, and we have an ample supply for one month for the family.

"If the larger quantity of potatoes has been used the smaller amount of flour would have been ample, while if eggs were cheap and two or more consumed by each person daily there should be a corresponding reduction in the amount of meat and fish."

ANNA BARROWS: "PRINCIPLES OF COOKERY."

NATURAL APPETITE A GOOD GUIDE

It is a satisfaction to know that the natural appetite is a very good guide in selecting a balanced ration if all the food principles are generously supplied. For instance, if a meal consisting of bread and butter, meat or eggs, and vegetables (not peas or beans) be provided, one with a good healthy appetite may be trusted to take a well balanced ration. If, however, the eggs and meat were absent there would be a lack of proteid for the amount contained in the bread and vegetables would not be enough to make a balanced ration. If, on the other hand, the vegetables were baked beans, and eggs and meat were both supplied, the proportion of proteid would be too great.

MISTAKES TO BE AVOIDED

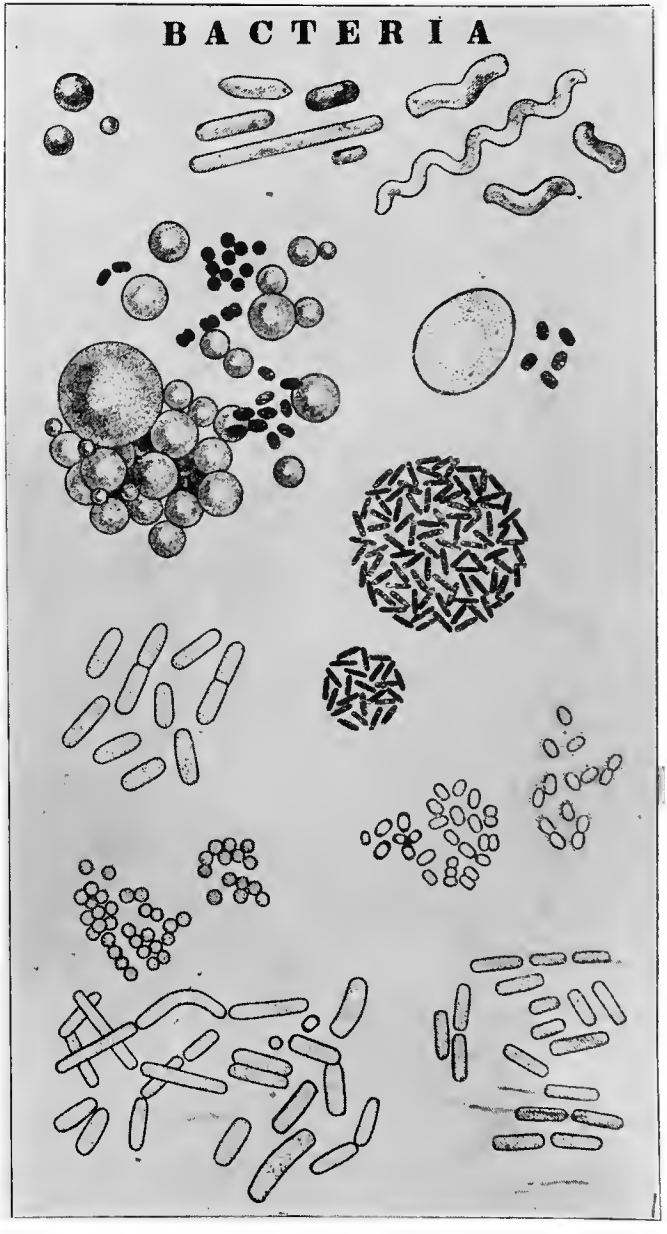
In general, foods rich in proteids are the most expensive and those having a large proportion of carbohydrates the cheapest. It therefore follows that people who try to live with the least possible outlay are likely to have too little proteid and conse-

quently will not be well nourished. While those who have an abundance are apt to take too much proteid and thereby overload the system with nitrogenous compounds which often result in serious disease.

FURTHER STUDY

Farmers' Bulletin 142, "Principles of Nutrition and Nutritive Value of Food" may be obtained free by writing to the U. S. Department of Agriculture at Washington. This bulletin is full of interesting information including answers to several questions given below on page 52.

A GROUP OF DOMESTIC SCIENCE CLUB GIRLS



The spheres (representing fat globules) and the elipse (a yeast cell) show comparative size of bacteria.

COOKERY

REASONS FOR COOKING FOOD

Briefly the reasons for cooking food are: (1) to make it more wholesome, (2) more attractive, (3) more digestible.

Tiny organisms so small that we cannot see them with the naked eye have been revealed to us by the microscope. These minute living things are commonly known as microbes or bacteria and are sometimes spoken of as our secret friends and foes. Some of these are harmless and by their presence improve the flavor of food. These are our friends. Others produce poison in food and also in the human system when they gain entrance. They are therefore our enemies and should be guarded against. Heat kills these micro-organisms; therefore, with rare exceptions, cooking food sterilizes it and under certain conditions renders it more wholesome.

The cooking of many food materials develops in them pleasing aromas, makes them more attractive in appearance, and also more palatable. Scientists tell us that other things being equal, food that is pleasing to the senses of smell, sight, and taste is more easily digested than unattractive food, because it stimulates the various glands and causes the digestive fluids to flow more freely. There is therefore a physiological reason for making food attractive. A man speaks the literal truth when he looks at a chicken pie and says, "That makes my mouth water."

Cooking softens the cellular tissue of both animal and vegetable foods so that it may be more easily acted on by the digestive fluids. Heat changes the starch rendering a portion of it soluble thus aiding in the digestive processes. It is probable that cooking sometimes renders the proteids less digestible as when eggs or meats are cooked at a high temperature. It is thought that heating proteids at a low temperature for a longer time does not have this effect and this is the reason why the cooking of proteids in eggs and meats at low temperature is recommended.

GENERAL PRINCIPLES

BE CLEAN

Keep food materials and cooking utensils clean. Dangerous bacteria and disease walk hand in hand with dirt. The disagreeable flavors which often appear in food are in many instances due to lack of care in dishwashing, or to slovenly methods practiced in the preparation of food. No pains should be spared in keeping all foods and cooking utensils in a clean and wholesome condition. As food spoils more easily in summer than in winter, special vigilance should be exercised in hot weather. Lack of care in this regard not only renders food unpleasant in flavor but is likely to result in serious illness.

ECONOMIZE FOOD MATERIALS, TIME AND STRENGTH

The well known saying that an American family wastes enough to keep a French family, is doubtless an exaggeration; nevertheless it is true that there is an immense amount of food materials and also human energy expended unwisely in American homes. The lack of economy of food materials is to be regretted but the waste of energy is far worse. It often happens that the homekeeper who does not economize her time and strength breaks down and sometimes sacrifices her life to this useless waste.

MEASURE ACCURATELY

Many failures attributed to "bad luck" are really due to inaccurate measurements. In the first place, the cup, the article most commonly used in measuring, varies in size. Some cups hold one half pint, others more, and still others less. The inexperienced person will find it greatly to her advantage in learning to cook, if she will get a measuring cup and use it in making her measurements. These cups hold one half pint and are divided into thirds on one side and fourths on the other. They are made in tin and in glass. The tin ones cost ten cents.

There is great difference in the manner in which different people measure with a spoon. Some fill the spoon level full, others round over the top and still others have it heaped in varying

degrees. For example, one person following a recipe which calls for a teaspoonful of soda, will use twice as much of this material as another working from the same directions.

This difficulty is obviated in schools of Domestic Science by using level measurements. The lesson in measuring which follows is inserted for the purpose of giving helpful suggestions to girls who belong to domestic science clubs and also to teachers who wish to introduce some of this work into schools where no equipment for teaching cookery has been provided.

LESSON IN MEASURING, BANCROFT SCHOOL

LESSON IN MEASURING

Lesson given to sixth grade pupils in the Bancroft School, Lincoln, Nebr., by Miss Lura Belville, student of Home Economics in University of Nebraska.

A twenty-five minute period of school time is used each week for the class work. The pupils do the practice work in their homes.

UTENSILS AND MATERIALS USED

Teaspoon	Sugar
Tablespoon	Salt
Measuring cup	Flour
Pint cup	Water
Quart cup	
Balance	

If each child can be supplied with these utensils and do the actual measuring, the exercise is of more value.

If this is impoossible, some pupil may demonstrate before the class.

The teacher should impress upon pupils the importance of careful measurements.

A spoonful of any dry material is a level spoonful.

A cupful is not more than the cup level full.

A cup or spoonful of liquid is as much as the cup or spoon will hold.

Dry material should not be pressed or shaken down when measured. Fill the spoon and level off with a case knife. A rounding spoonful is twice as much as a level spoonful.

To find one half a spoonful, divide lengthwise of the spoon with a knife; for one quarter spoonful, divide the half crosswise, and for an eighth, divide the quarter.

If the tea and tablespoons are standard, three teaspoons equal one tablespoonful.

Sixteen tablespoons equal one cupful.

In all of the measuring, the tin measuring cup is used. It is divided into halves, quarters and thirds.

Give pupils practice in measuring tea and tablespoonfuls of sugar, flour, water, etc.

Have them measure cupfuls, $\frac{1}{2}$ cupful, $\frac{1}{3}$. $\frac{1}{4}$, and $\frac{2}{3}$ and $\frac{3}{4}$.

Weighing articles will give valuable exercise.

If possible the teacher should be supplied with balances or scales.

First, weigh the cup, then the cup filled with water, thus ascertaining the weight of water. The results may be recorded as follows:

Weight of cup	2.5 oz.
Weight of cup and water	10.5 oz.
Weight of water	8 0 oz.

Weigh sugar and flour in the same way and tabulate results.

The old saying that "a pint is a pound the world around" is approximately true with reference to many food materials, therefore a pint and a pound are used as synonymous terms in weighing

water, milk, sugar, butter and many other things, but flour is only about half as heavy as these, requiring a quart to equal a pound.

Mental arithmetic drill

(a) If one cup of flour weighs ¼ lb., find weight of 12 cups.
(b) How many oz. in 2 cups flour?
(c) How many oz. in 2 qts. flour?
(d) I buy 3 pints of sugar. Find cost at 6 cents a pound.

This mental exercise may be lengthened and reviewed from time to time.

APPLY HEAT WISELY

Apply heat to food materials in such manner as to render them wholesome and attractive.

If the substances to be used in the making of a cake have been accurately measured and properly mixed the cake may be ruined in baking. To learn how to apply heat wisely to different food materials under varying conditions is one of the most difficult as well as one of the most important lessons to be learned by all who would succeed in the art of cooking. Much must be learned from experience, the best and sometimes the most expensive of all teachers. A few general suggestions may, however, be found helpful though full directions should be studied by the beginner as each new dish is undertaken.

First, one should understand her stove and know how to regulate the heat by means of dampers, use of fuel, etc.

Second, there should be a definite purpose in mind and work should be directed toward its accomplishment. For example, one has a piece of meat to cook. If she wishes to make from it soup or a stew she will put it in cold water, raise the temperature gradually and cook it slowly in order that the juice may be extracted from the meat and enrich the soup or gravy. On the other hand, if one desires to keep the juices in the meat she will put it in boiling hot water, if she wants a pot roast, or into a very hot oven, if an oven roast, in order that the albumen on the surface may be hardened and the juice retained. If the roast has been put in the oven the heat will be reduced after the surface has been seared and the

roasting will be continued at a lower temperature. The length of time depends on the size of the roast.

Third, a double boiler or some kind of water bath should be used for cooking such foods as cereals that burn easily and need long cooking at comparatively low temperatures. This method makes stirring unnecessary and keeps the food from burning.

WORK INTELLIGENTLY

Think, study, use brain as well as brawn; apply the discoveries of scientists, artists and inventors in your work.

Putting thought into work transforms drudgery into delight. Try and see if it is not true.

"Who toil aright, for those
Life's pathway, ere it close
Is as a rose."
—Sir Lewis Morris.

CEREALS AND HOW TO COOK THEM

"And the prairies are clad for many a mile—
With the tossing plumes of corn,
And the fields of wheat wave like a sea
Of green, on a summer morn—
In Nebraska, the land of corn."

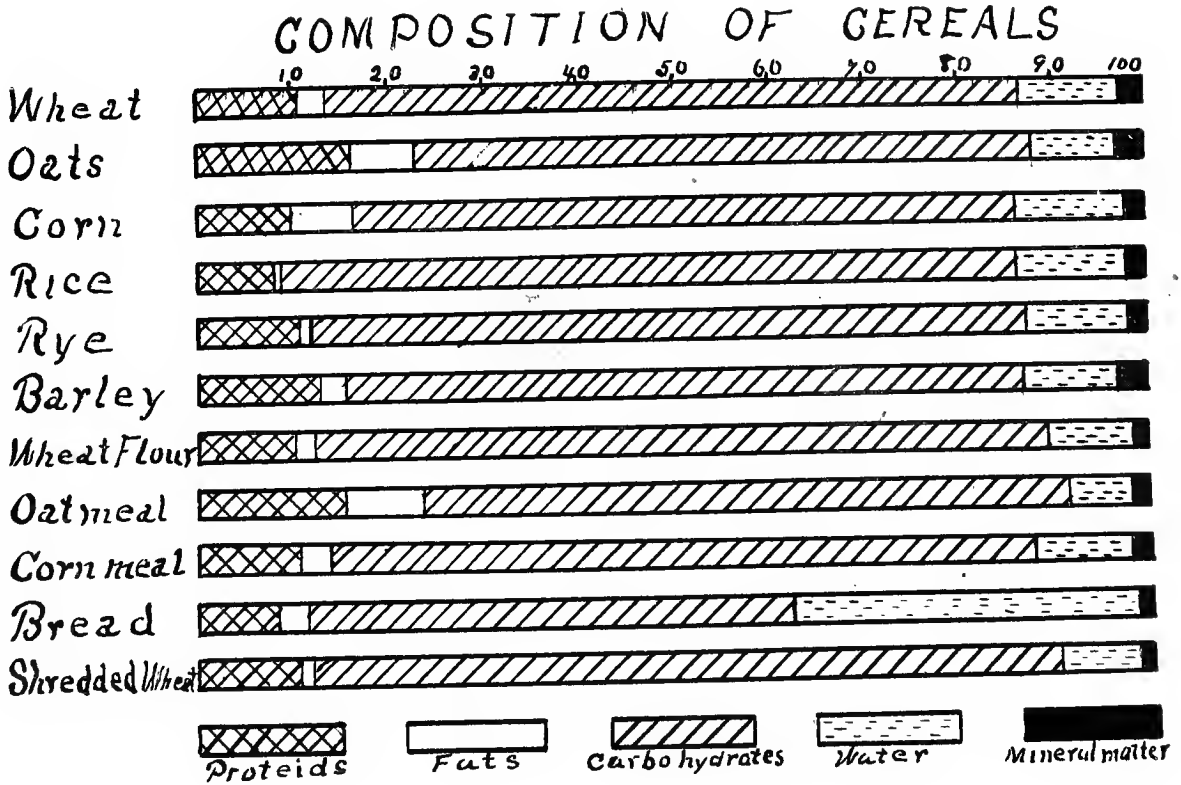
—DUNROY.

CERES

From the point of view of food production, cereals form one of the most important classes of the vegetable kingdom.

The word cereal comes from Ceres, the Roman name given to the Greek goddess Demeter who was supposed to have supervision of grain and harvest.

The cereals belong to the order Gramineae (grasses). They have hollow jointed stems and alternate parallel veined leaves. The seeds of these plants form a large proportion of the food of both men and the lower animals.


COMPOSITION OF CEREALS
10
20
30
40
50
60
70
80
90
100
Wheat
Oats
Corn
Rice
Rye
Barley
Wheat Flour
Oatmeal
Corn meal
Bread
Shredded Wheat
Proteids
Fats
Carbohydrates
Water
Mineral matter

The most important cereals grown in this county are wheat, corn, oats, rye, and barley. Rice ranks as the first cereal in China and Japan. Recently its cultivation has been introduced quite extensively in our own southern states.

FOOD VALUE

According to Farmers' Bulletin 249 cereals supply 22 per cent of the total food.

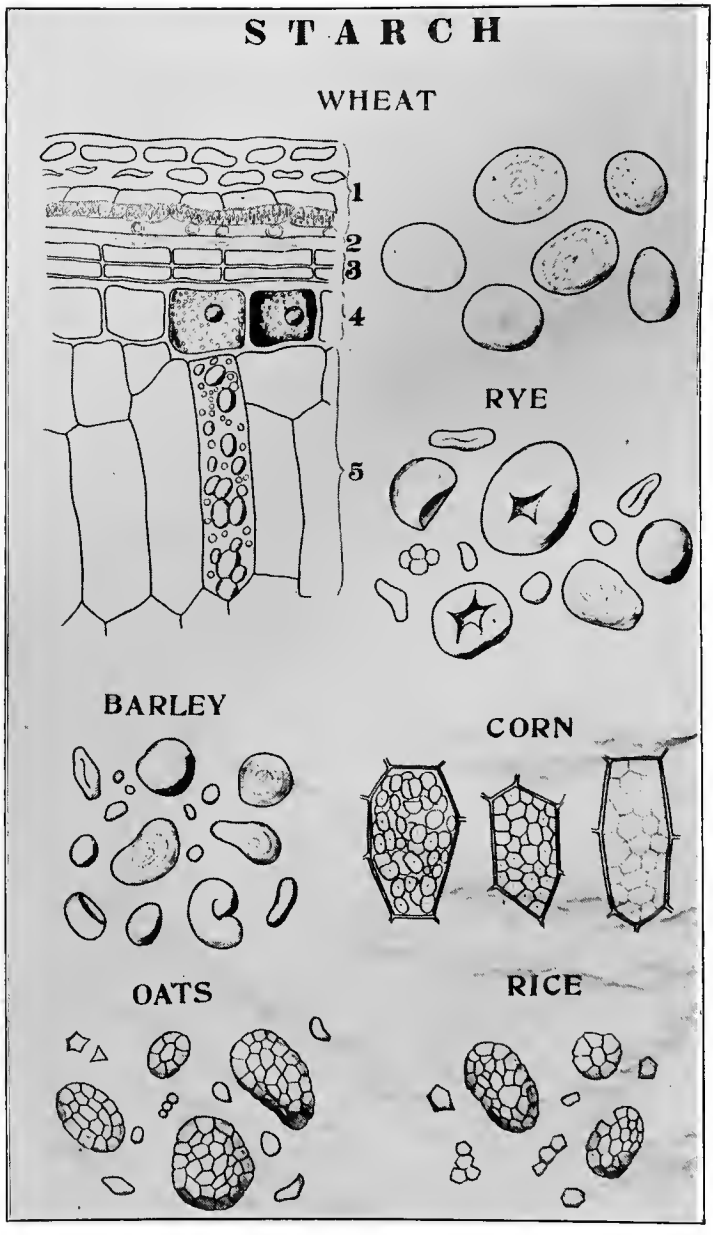
Cereals are rich in carbohydrates, the starch varying from 70 to 80 per cent. Of all the cereals, oats contain the most proteid, many analyses showing an average of 16 per cent. In wheat the muscle building substances vary from 9 to 15 per cent the average being not far from 12 per cent. The percentage of water in flour is about the same as the proteid. The cereals as a class are poor in fats but corn and oats have more than other grains and generally show from 7 to 8 per cent. The fat in rice is usually less than 1 per cent while it sometimes runs as high as 3 per cent in wheat though 2 per cent is near the average. Cereals all contain mineral matter the amount varying from a fraction of 1 per cent in rice to 2 or more in oats.

"Judged by their chemical composition alone, that is, by the total amounts of nutrients furnished, of the six most important cereal grains, namely, wheat, oats, rice, corn, rye, and barley, oats appear to furnish the nutrients in better proportions than the other cereals. Wheat ranks very close to oats and corn next to wheat."

———Cereals supply actual digestible nutrients to the body more cheaply than any other class of foods except dried legumes (peas, beans, etc)". —Farmers' Bulletin 249.

Cereals are extensively used because they are so rich in nutrients and contain so little refuse. Also because they are comparatively inexpensive and keep well. Moreover, they are easily prepared for the table and are palatable and digestible.

STARCH



BREAKFAST FOODS

EXTENSIVE USE

The use of cereals as breakfast foods has greatly increased during recent times. Indeed, so extended is their use for this purpose that cereals and breakfast foods have come to be synonymous terms. So great is the variety of the different brands that their name is legion.

It is supposed that the use of oats as a human food originated with the Scotch. The sturdy character of the Scotchman is often attributed to the oatmeal, which, with milk, formed so large a portion of his diet. It is related of Dr. Johnson that he once said to a Scotchman, "Oats is a grain fed to horses in England but eaten by men in Scotland." Whereupon the Scotchman replied, "Yes, and I have noticed that they grow the best of horses in England and the best of men in Scotland."

In the United States the present extensive use of breakfast foods doubtless had its beginning in the oat meal which the Scotchman brought with him when he came to this country.

The chief use of oatmeal is as a breakfast food made into mush or porridge, though muffins and cookies are sometimes prepared from it.

Corn is used more extensively in the preparation of corn bread and various other dishes, than as a breakfast food.

The greater part of all the wheat in the world is consumed in the production of bread. Nevertheless, large quantities of breakfast foods of varied brands are made from this most highly prized cereal.

The amount of rice used as a breakfast food has been comparatively small, until recently when it has appeared in new forms one of which is puffed rice. This has met with considerable favor as a breakfast dish.

CLASSIFICATION

Breakfast foods are classified according to the grain from which they are made and also as to their preparation. According to the latter classification they may be divided into three groups, first those prepared from the uncooked grain, second from the

cooked, and third, usually from cooked food, to which some substance, as malt, has been added to make it more digestible.

To the first class belong all uncooked grains, whether they be put on the market whole, broken, rolled, or ground as whole rice grains, cracked wheat, steel-cut oatmeal, or ground corn meal.

Examples of the second class are rolled oats which have been partially cooked by steam, corn flakes, force, and other preparations which have been thoroly cooked, including shredded wheat biscuit, the wheat of which has been boiled, shredded and baked as biscuit.

The third class is made up of the so called predigested or malted breakfast foods. These foods are usually cooked before the malt is added. The cooking increases their digestibility and the malt added is supposed to change some of the insoluble starch to the soluble form. [1]From analyses made of these foods it is evident that only a small amount of the starch is thus changed and the conclusion is reached that they probably do not merit the name predigested.

[1]Farmers' Bulletin 249 pp. 20, 21.

THE COOKING OF CEREALS

Those who have studied human nutrition generally agree that cereals should be thoroly cooked. Long cooking of these foods is recommended, first, because they are rich in starch and the granules of this substance are broken open by heat thus making the starch more soluble and accessible to the digestive fluids; and second, because experiments seem to show that the human digestive organs are able to utilize only a very small portion of the cellular tissue of the cereals before they are thoroly cooked. By the long continued application of heat, these tissues are so changed that the greater portion becomes digestible. Moreover, long cooking besides making such cereals as contain a considerable amount of cellular tissue, as corn and oatmeal, more wholesome, also decidedly improves their flavor.

Rice needs to be cooked only until the grains are tender as it has very little cellular tissue.

To cook cereals in a single basin or kettle long enough to make

them wholesome is a very tedious process because so much time must be spent in stirring and watching to keep them from burning. If, however, the double boiler be used, very little time need be expended in the cooking of cereals. To begin with, ten minutes is required to boil the cereal in the inner portion of the double boiler, placed directly on the hot stove or over a flame. During

DOUBLE BOILER

this time frequent stirring is needed to keep the substance from burning. The inner boiler is then placed in boiling water which the outer boiler contains and the food left to cook from one to three hours according to cereal used and result desired. The only further attention required is to see that the food be kept moist enough and that water continues to boil in the outer receptacle.

AMOUNT OF WATER USED

The amount of water required in the preparation of breakfast foods varies with the kind and condition of the cereal, different samples of the same grain requiring different amounts of water because some are drier than others. The longer the cereal is cooked the greater the amount of water needed because, even though the boiler is covered, some water escapes by evaporation.

The amounts stated in the receipes given in the lesson on cereals which follows may be taken as a guide and modified to suit varying conditions.

OATMEAL MUSH

Oatmeal which has been steamed in the process of manufacture of course does not need to be cooked as long as the so-called steel-cut oatmeal which is raw. Most rolled oats are steamed

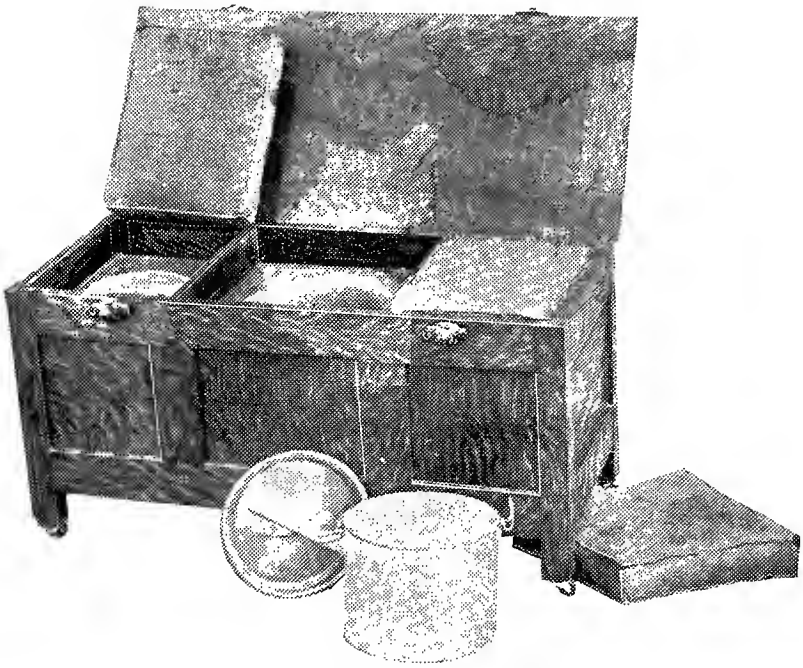
at the mills. In general, cereals should be cooked about twice as long as the statement on the package requires. Oatmeal that has not been partially steamed in its manufacture ought never to be used unless cooked at least an hour and is much improved if cooked two or three hours. As a matter of economy both of fuel and time, it is well to cook oatmeal the day before it is to be served, then it can be warmed for breakfast in a very few minutes.

A very excellent and economical method of cooking cereals is by means of the fireless cooker, or the hay cooker as one modification of this device is called. The results secured with the fireless cooker equal in every respect those obtained with the double boiler and the fuel required is much less. The cereal is boiled for ten minutes the same as if it were to be cooked in a double boiler. It is then placed in the fireless cooker and allowed to remain several hours, the number varying according to the cereal. Rice, if previously soaked, is thoroly cooked by this method in three hours. If oatmeal be put into this cooker in the evening, in the morning it will be ready for breakfast, hot and thoroly cooked, having an excellent flavor.

FIRELESS COOKER

The simplest form of this cooker may be made in any home from an old trunk or a box with a tightly fitting lid. This box should be filled with hay packed in very closely and a hole or nest made in the middle of the hay of such size and shape that it will hold the kettle or jar in which the cereal is to be cooked. This receptacle should have a cover that fits tightly. After the cereal has been cooked for ten minutes it is put boiling hot in the dish in the hay box and covered with a closely fitted cushion of hay and the box cover closed. The hay is a non-conductor of heat and the food which was put in boiling hot therefore remains hot for many hours and is thoroly cooked without additional heat.

Fireless cookers made according to the same principle are sold by furnishing houses. These are upholstered and are easier to handle because the hay does not get scattered in putting in and removing the food. Moreover, the holes are made to fit the receptacles designed for them. In some of these cookers mineral wool,



FIRELESS COOKER

a non-conducting substance used extensively in cold storage buildings is used in place of the hay. A very convenient arrangement is to have an upholstered fireless cooker in the seat of a kitchen settle. A kitchen settle is pictured and described, under the name of combination table, seat, and chest, on pp. 12 and 13 of Convenient Kitchens, Home Study Series, No. 1.

CORN MEAL MUSH

In making corn meal mush the meal should be sifted gradually into the boiling water and stirred continually; otherwise lumps are likely to form. After the mixture has boiled for ten minutes the cooking may be finished in the double boiler with little further attention.

LESSON ON CEREALS

The following lesson was given, as was the one on measuring, by Miss Belville to sixth-grade pupils in the Bancroft School, Lincoln, Neb.:

This class of foods was studied as to the growth of the plant, the leaves, value as a food, mode of manufacture, various brands, and preparation for food.

The following recipe was given the children to be worked out in their homes:

1 cup oatmeal
2 cups water
1 teaspoon salt

Cook over direct flame or on hot stove for ten minutes, then in double boiler for from one to three hours.

The pupils cooked the oatmeal at home and brought samples to school for testing and grading. That brought by some of them had been cooked three hours.

The children learned, (1) the use of the double boiler of which many had never heard, those who did not have the double boilers improvised them, (2) that oatmeal cooked three hours is better than that cooked one hour.

Many ways of serving were suggested by the children:

(1) Serve with cream and sugar.

(2) Remove core from baked apples, fill with oatmeal and serve with whipped cream and sugar.

(3) Use fruit juice instead of cream and sugar.

(4) Sliced fruits served with oatmeal.

(5) Cold oatmeal may be sliced and fried.

Rice was studied in a similar manner.

The rice should be washed before cooking.

1 cup rice
3 to 4 cups water
1 teaspoon salt

Cook for ten minutes over direct flame or hot stove, then in double boiler about an hour.

Stir as little as possible and always with a fork.

Raisins may be added.

(1) Rice may be served with cream and sugar.

(2) Serve with gravy as vegetable.

(3) Serve with fruit.

(4) Use in various kinds of puddings.

(5) Bake with salt, pepper, butter and grated cheese.

The children were asked to bring in the results of their cooking. Samples came cooked and served in many ways.

Each child was given a grade for every dish brought in.

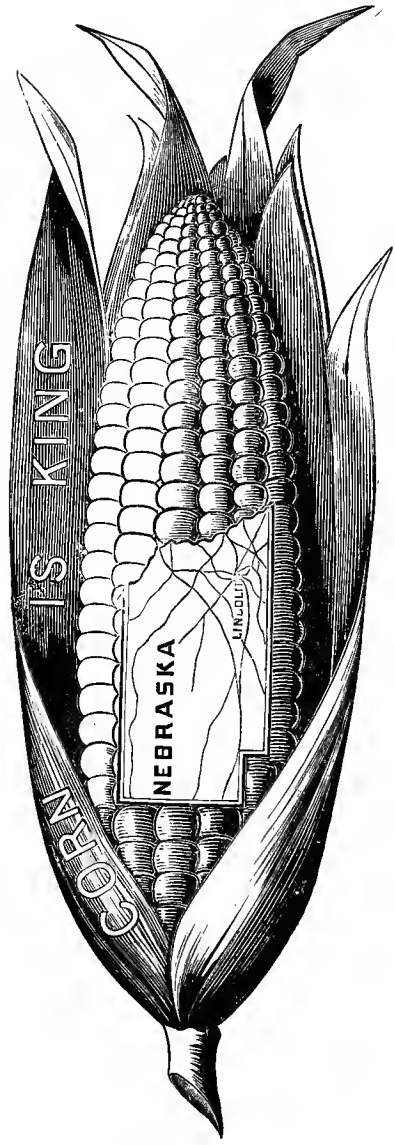
When the children were asked the number of breakfast foods on the market, they began a search in wholesale catalogues, in grocery stores, and other places, with the result that they listed more than fifty varieties or names of socalled "breakfast foods."

The pupils were much interested in making cook books in which to keep their recipes. They used gray drawing paper for covers and fastened in them a number of leaves of blank paper. The covers were lettered and decorated with water colors. The children chose the names for their own books; among which are the following:

"The Every Day Cook Book," "The Good Cook's Cook Book", "The Monday Afternoon Cook Book", "The Economical Cook Book", "The Bancroft Cook Book", "The Home Made Cook Book".

These books were called in from time to time to be graded.

Both boys and girls were interested in this work.


CORN
IS KING
NEBRASKA
LINCOLN

CORN BREAD

A BEAUTIFUL PLANT

"How straight and tall and stately stand
Its serried stalks upright and strong!
How nobly are its outlines planned,
What grace and charm to it belong!
What splendor in its rustling leaves!
What richness in its close-set gold!
What largess in its clustered sheaves,
New every year, tho ages old!"

—CELIA THAXTER.

Since corn is King in Nebraska, and in the state there are raised such enormous quantities of corn it is fitting that corn products should have a place in the cooking contests of Nebraska.

Corn bread or Johnny cake doubtless had its origin in America, because maize, or corn as it is commonly called, is a native of this country. The crude food which the Indians prepared from corn and baked on hot stones before their camp fires and the hoe cake of the negroes are among the primitive forms of corn bread.

By the addition of such substances as milk, eggs, sweetening, shortening, etc., many varieties of corn bread have developed which are much more palatable than the primitive forms.

Corn bread is usually made light by means of baking powder or soda used with cream of tartar or sour milk.

Corn contains less proteid than wheat and that which it has is not in the form of gluten which makes possible the light porous loaf produced from wheat flour. For this reason, there can not be made from corn meal or flour a loaf having the same pleasing porous texture that loaves made from wheat flour possess. Bread made from corn meal crumbles easily and that made from rye is inclined to be sticky. Therefore a bread made from a mixture of the two is considered by many an improvement on that made from either used alone. In the well known Boston brown bread Graham flour is added to the mixture of corn meal and rye. This bread is steamed or baked a long time in a slow oven. The high favor in

which this bread was held in New England was probably largely due to the flavor developed by baking in the brick oven of the long ago. Those ovens gave a regular heat and the bread remained in the oven for hours at a temperature low enough to keep it from burning and high enough to bake it thoroly. The recipe for Boston brown bread given by Miss Farmer in the Boston School Cook Book is as follows:

BOSTON BROWN BREAD

1 cup rye meal.
1 cup granulated corn meal.
1 cup Graham flour.
¾ tablespoon soda.
1 teaspoon salt.
¾ cup molasses.
2 cups sour milk, or 1 ¾ cups sweet milk or water.

Mix and sift dry ingredients, add molasses and milk, stir until well mixed, turn into a well-buttered mould, and steam three and one-half hours. The cover should be buttered before being placed on mould, and then tied down with string; otherwise the bread in rising might force off cover. Mould should never be filled more than two-thirds full. A melon-mould or one-pound baking powder boxes make the most attractive shaped loaves, but a five-pound lard pail answers the purpose. For steaming, place mould on a trivet in kettle containing boiling water, allowing water to come half-way up around mould, cover closely, and steam, adding, as needed, more boiling water.

The steamed corn bread or brown bread given in the Nebraska Corn Book, issued in 1906, is made of corn meal with Graham flour.

STEAMED CORN BREAD

4 cups sour milk.
1 cup molasses.
2 ½ cups corn meal.
2 cups Graham flour.
½ cup raisins seeded.
3 teaspoons salt.
5 teaspoons soda.
Steam four hours.

One half of this recipe may be used to advantage.

The golden corn cake given in the same book copied from Boston School Cook Book is an example of corn bread made with corn meal and white flour.

GOLDEN CORN CAKE

¾ cup corn meal.	1 egg.
1 ¼ cups flour.	½ tablespoon melted butter
¼ cup sugar.	4 teaspoons baking powder
1 cup milk.	1 teaspoon salt.

Mix and sift dry ingredients; add milk, egg well beaten and butter; bake in shallow buttered pan twenty minutes.

The above will make a cake about two inches thick if baked in a pan 6x8 inches.

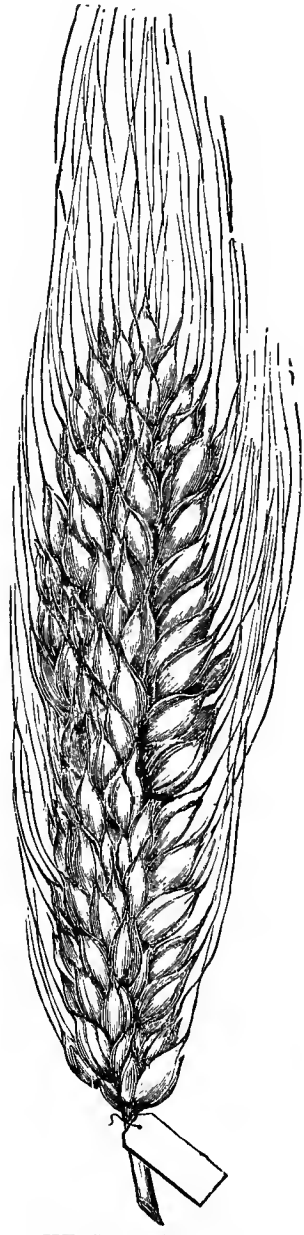
Corn bread may be made of corn meal without the addition of the flour of other grain but the taste is not as pleasing to most people as when some other flour is used with the corn meal.

WHEAT BREAD

Of all cereals wheat in most highly prized. Oats, so far as actual nutrients are concerned, equals it in food value. Indeed the average per cent of the muscle building substance in oats is considerably higher than in wheat but the proteid in the wheat is largely gluten, a gray, tenacious, elastic material, which makes possible the light porous character of the loaf made from wheat flour. The same spongy attractive texture cannot be secured with meal or flour made from other grains, because comparatively little of their proteid is in the form of gluten. By washing in running water a piece of dough made from wheat flour, an elastic gummy substance is obtained which is gluten. Likewise the gum which children get by chewing wheat grains is gluten.

HISTORY

The history of bread is as old as that of the human race. It is probable that the first bread was made by baking on hot stones or under hot ashes, a mixture of water with grains broken by pounding, or coarsely ground between stones. Doubtless in the long, long ago, some tent wife left a portion of her dough without baking. The next morning she found this dough full of tiny holes. The micro-organisms, though their existence was unknown, had done their work in producing a gas which made the dough light. The dough was baked and the quality of the bread was improved because



HEAD OF WHEAT

of its porous nature. Thus leaven was discovered which is the ancestor of the yeast of today.

Through the centuries, step by step, advances have been made until there has developed from the crude bread of ancient times a loaf which is practically perfect in form and color, and in taste and texture.

In the production of this perfected product, many factors have been employed. Among these may be mentioned, (1) the invention of many devices which are used in the making of bread, (2) the improvement in methods of cookery, (3) the investigation of the nature and life history of yeast plants, (4) the new methods of milling whereby impurities are removed from the wheat grains and cleaner and better flour is produced.

PREPARATION OF BREAD

METHODS OF MAKING BREAD LIGHT

At the present time there are two general methods of making bread light, one is by means of yeast producing what is ordinarily known as raised or light bread, and the other by the use of baking powder, or soda, used with cream of tartar or sour milk. There is another method, not in common use, of lightening bread, by forcing gas into the dough by mechanical means. An example of this is the Dauglish process, devised by an Englishman. In this bulletin only the first method will be discussed.

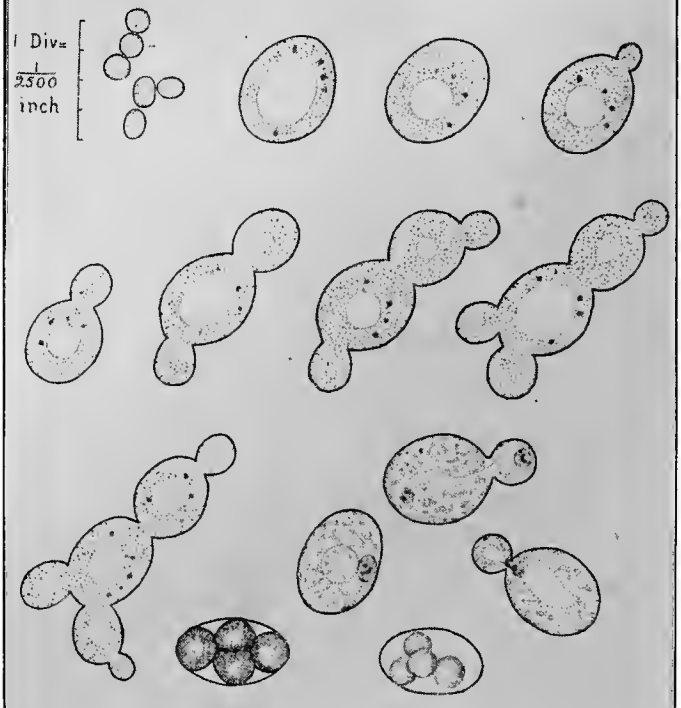
YEAST AS A LEAVENING AGENT

Whether considered from the home or from the scientific viewpoint, the production of light bread by the aid of yeast is an intensely interesting process. The marvelous character of the changes which take place in the mixing bowl and the oven, having been revealed to us by the investigation of scientists, give to the art of bread-making new interest.

Yeast is composed of tiny cellular plants so small that they cannot be seen with the naked eye. Like larger plants these microscopic ones thrive if given nourishing food and favorable conditions of temperature and moisture. The temperature which

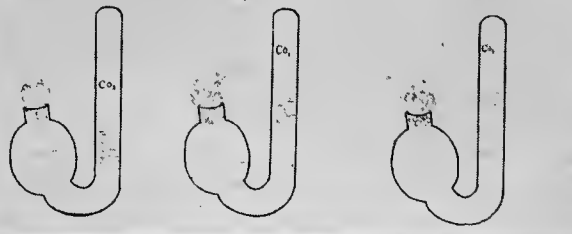
YEAST

Saccharomyces cerevisiae



$$C_6H_{12}O_6 = 2C_2H_6O + 2CO_2$$

GRAPE SUGAR ALCOHOL CARBON DIOXIDE



seems best suited to their development is 70°—90° F. (21°—32° C.). When too cold these yeast plants do not grow and are killed if the heat be raised to 158° F. Under favorable conditions they grow and propagate very rapidly by a process called budding. On one side of the cell, of which the tiny plant consists, there appears a swelling called a bud. This bud enlarges, produces other buds of irregular form which separate from the parent cell, thus forming new plants.

Yeast requires for its food the same elements which are necessary for the nourishment of other plants. When yeast is added to a mixture of flour and warm water, the tiny plants begin to grow because they find in the flour the food which they need for their development. From the proteid they get the requisite amount of nitrogen. Likewise the flour contains the mineral matter required for their growth. Flour also contains a kind of sugar called glucose which is not as sweet as ordinary sugar. A solution of this glucose in the presence of the other substances named, furnishes an excellent medium for the development of the yeast plants. A very remarkable thing about their growth is the power they have of breaking up the glucose into alcohol and a gas called carbon dioxide This gas is the agent which, as it rises through the dough, gives the porous character to the mass. The gluten, moreover, serves to entangle the gas and prevent its escape. One reason for adding sugar to the mixture when starting bread is to furnish food for the yeast plant. A large amount of sugar, however, retards its growth. A considerable amount of fat likewise retards the growth of the yeast and consequently causes the dough to rise more slowly.

FORMS OF YEAST

Yeast as it is ordinarily used in bread making occurs in three forms known as compressed yeast, yeast foam, and homemade yeast. The latter is sometimes kept in the dry form but more commonly used as soft yeast.

The compressed yeast contains more yeast plants to the cubic inch than the others and therefore raises the dough more rapidly. It is purchased in small moist soft cakes wrapped in tin foil. Unless kept in a cool place it spoils quickly. For this reason it can be

used only by those who can buy it just before using, or who have refrigerators in which they may keep it, consequently it is seldom used in rural homes.

Yeast foam is sold in packages of small dry cakes and can be kept much more easily than the compressed yeast. It is not so rich in yeast plants and therefore does not act as rapidly but is very generally used because it keeps well. Just as good bread may be made with it as with the compressed yeast.

In some rural neighborhoods the soft homemade yeast is used almost exclusively. If this is properly prepared and carefully kept excellent bread may be made from it. There is, however, danger of acid fermentation setting in as the old yeast is kept from one baking till another. When this happens the bread made with it has a slightly sour taste and odor though the texture is fine. At certain county contests the writer has noticed that with two or three exceptions all the bread exhibited had this slightly acid flavor. Upon inquiry it was learned that nearly all the people in the neighborhood used the homemade yeast and that it had been passed from one home to another. It seems that the people had become so accustomed to this flavor that it had ceased to be objectionable to them.

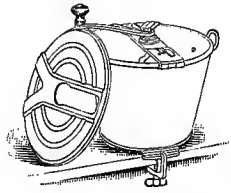
THE YEAST PLANTS AT WORK

When yeast is added to a warm mixture of flour and water the tiny plants very soon begin to grow and do their work of producing gas which makes the bread light. With the aid of a compound microscope one may actually see the buds form on the tiny cellular plants. The bubbles of gas produced by the action of the yeast on the glucose gradually fill the mixture and it becomes a light spongy mass. The gluten of the flour acts like a curiously devised trap entangling the gas and preventing its escape. When the mixture is very light, more flour is added and the whole mass kneaded.

THE PURPOSE OF KNEADING

The purpose of kneading is two fold, first, to distribute the gas evenly throughout the entire mass so that the pores may

be of uniform size, and second, to mix the flour into all portions alike so that there shall be no streaks and the texture shall be the same all through the crumb of the loaf, which is the portion within the crust. The gluten of the flour serves to retain the gas and thus gives the porous character to the loaf. In order that



BREAD-MIXER

the bread may be fine in texture the kneading must be thoroly done. Formerly the kneading of the dough was the hardest part of the work of bread making, but recently there has been devised a utensil called a "bread mixer" by means of which the dough is so thoroly mixed that the labor of kneading by hand may be dispensed with. This mixer is on sale in many house furnishing establishments. The price is two dollars.

THE EFFECT OF HEAT

When a loaf of unbaked bread is placed in the oven the heat changes it as follows: (1) it prevents the further production of gas by killing the yeast plants, (2) it increases the size of the loaf by expanding the gas, (3) it volatilizes the alcohol formed from the glucose, (4) it hardens the gluten thus making permanent the porous character of the loaf, (5) it forms a crust over the loaf which prevents the dough from rising enough to make the bread too light and dry, (6) it cooks the starch rendering it more digestible, (7) it changes some of the starch in the crust to glucose and dextrin which is considered more digestible than the starch and by partial carbonization gives the crust a beautiful brown color and pleasing flavor.

IMPERFECTIONS THAT SOMETIMES OCCUR IN BREAD

HEAVINESS OR DOUGHINESS

Heaviness or doughiness which occur all too frequently in bread is usually due to one or more of the following causes: (1) insufficient raising, (2) poor flour which cannot absorb as much water as it should, (3) too much liquid in proportion to the amount of flour used.

The addition of alum often improves the appearance of bread made from poor flour. The use of alum for this purpose is, however, objectionable; first, because it is, by most authorities, considered unwholesome; and second because it makes poor flour appear better than it is.

The large uneven holes which are often present in bread are in general caused either by allowing the bread to stand too long before baking, or when they occur immediately under the crust, by the heat of the oven being so great that the crust is formed before the gas has finished expanding.

SOUR BREAD

Sour bread, which is so objectionable, is due to the work of bacteria. These, our secret enemies, sometimes, though not often, get into our bread through the flour. They generally gain entrance through the yeast. If at any time during the process of bread making the dough is allowed to stand too long the bacteria if present begin their work of producing acids which spoils the flavor of the bread. This action is called acid fermentation. Objectionable bacteria may enter the bread by way of unclean utensils used in the bread making. It it therefore necessary to use great care in cleansing all dishes used in the process.

STICKY OR SLIMY BREAD

During the summer time it occasionally happens that bread which is very good when first baked, grows slimy on the interior of the loaf when it is two or three days old. According to investigations made by the [1]Wisconsin Experiment Station this peculiar change is

[1]Wis. Sta. Rpt. 1898, p. 110

due to the work of common potato bacillus (Bacillus mesentericus vulgatus).

This peculiar appearance of slime or ropiness has also been investigated by [1]E. J. Watkins who attributes the occurrence to the work of bacteria which get into the dough through the flour, coming possibly from the bran coats. According to this investigator breads containing bran and straight grade white flours are most liable to develop ropiness. These bacteria resist the heat of the oven, growing after the bread is baked. The presence of acid is unfavorable to the development of the bacteria. The author's experiments lead to the conclusion that "the addition of a small quantity of acetic acid to the dough will effectually prevent the appearance of ropiness in the resulting bread during a much longer period than bread is usually kept. The minimum quantity of acid appears to be about 0.3 lb. per sack of flour, whilst a maximum of 0.7 lb. should not be exceeded on account of its softening action on the gluten.

"Low temperature and dryness of the bread store tend to suppress development, but the maximum temperature of 18° C. (65° F.) can not be exceeded without great risk.

"When a batch of bread is found to be ropy, all flour in stock should be at once tested, so as to locate the infected stock, and in the meantime fresh supplies of flour from a different source should be laid in.

"When the infected batch of flour has been discovered, it should be isolated, so that it can be worked up under those conditions which are most unfavorable to the development of the bacillus, i. e., the doughs being made slightly acid and the bread being quickly cooled and kept at low temperature during storage. Such flour might advantageously be kept until the colder months when the prospects of development are at a minimum."

THE REQUISITES OF GOOD BREAD

FLAVOR

Perhaps the most important requisite of bread is a good taste. To define exactly what is meant by a good taste, or to determine which of several samples of good bread has the best taste is an

[1]Jour. Soc. Chem. Indus. 25 (1906), No. 8, pp. 350–357,

exceedingly difficult task, because there is so much variation in the taste of individuals. Nevertheless no one would question the statement that bread to be good, must have a pleasing flavor, a taste that is acceptable to the majority of people. In a contest the decision as to which of several loaves has the best flavor must be determined by the taste of the judge, who is supposed to have had experience and training in bread judging.

The term flavor, as used in the score card which follows includes both taste and odor. Excellent bread is pleasing in odor as well as taste and possesses not the slightest suggestion of a disagreeable odor.

TEXTURE OF THE CRUMB

Texture and grain are terms, that are used as yet, somewhat indefinitely in the description of the nature or character of the crust and the crumb of bread. The word texture comes from a Latin word which means to weave, and has therefore been applied to the nature of the substance woven and later to the character of the structure of other substances not woven. Accordingly it is said that the texture of the crumb of bread is excellent, when the pores are small and evenly distributed and the crumb is light but not dry and crumbly, when it is the same color all through and there are no places showing that the flour was not well worked in and no heavy or doughy streaks.

Under the heading of texture of crumb, in the score card which follows, there should be considered the following qualities of the crumb, (1) lightness, (2) color, (3) doughiness, (4) moisture.

In good bread the crumb is light, but not light enough to crumble, when cut or to dry out quickly. The holes should be small and uniform in size, no large holes.

It should be nearly white in color though the exact tint is not of as much importance as uniformity of color. There should be no color streaks which signify imperfect mixing. Lumps of flour are decidedly objectionable.

The crumb should be well baked to the center with no suggestion of doughiness in streaks or otherwise.

There are a few people who prefer their bread very dry but

this is not the case with the majority. The crumb should therefore be moist enough to be generally acceptable.

TEXTURE OF THE CRUST

The crust should be well done, of a rich brown color but never burned. It should have a pleasing flavor and should be neither too hard nor too soft to be palatable.

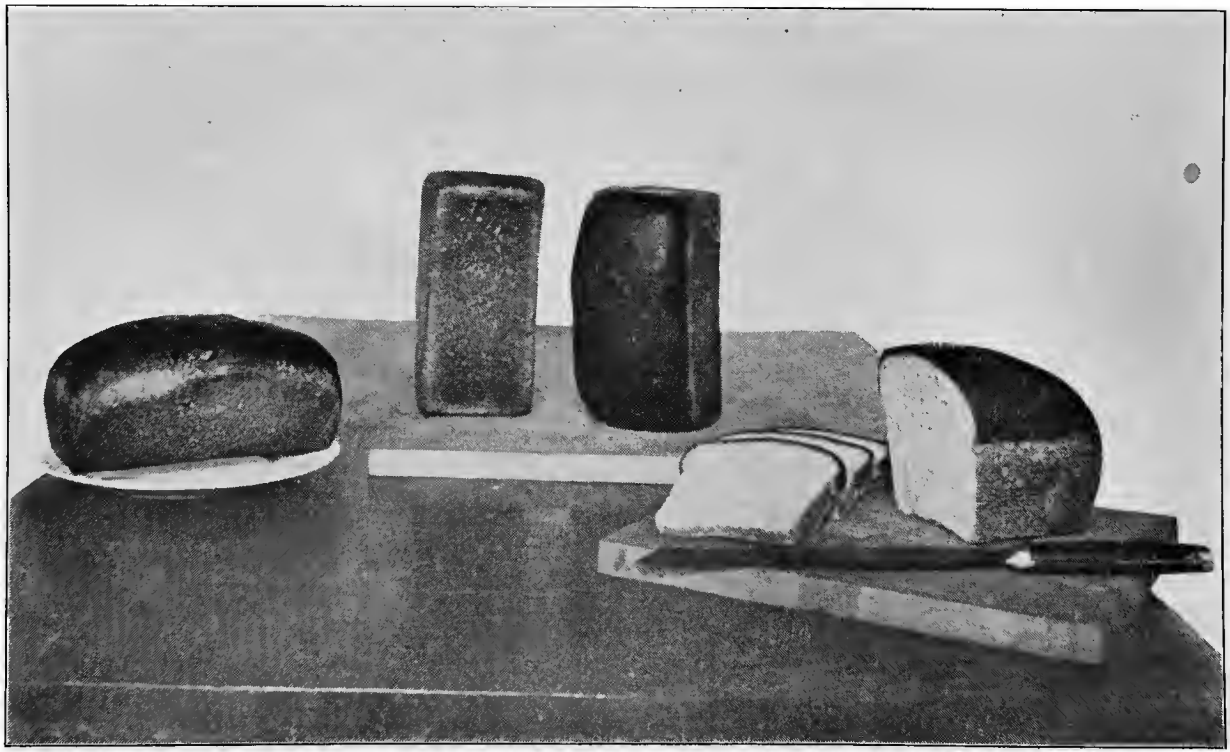
SIZE AND FORM

What the size of the loaf should be depends somewhat on where it is to be used. In cooking schools, in cooking contests, and in small families the small single loaf is preferred. A convenient size is 9 inches long by 4 inches wide. The crust if well baked is considered the most wholesome part of the bread and in the small single loaves the proportion of crust is greater than in large loaves, or in small ones where more than one is baked in the same pan.

There is accordingly some foundation for the opinion that small single loaves are the most wholesome. When loaves are baked singly and are entirely surrounded by crust they do not dry out as quickly as when one loaf is broken from another and a portion of the crumb is exposed. The size of a slice of bread cut from a small loaf is generally more acceptable than that cut from a large loaf. However, if the bread is to be served to harvesters, threshers, or others doing heavy manual labor doubtless, the large slices cut from a large loaf will prove more satisfactory.

It is much more difficult to bake a large loaf or several loaves in one pan, than a small single one because there is more danger of burning the outside before the center is thoroly baked.

The form of the loaf is perhaps the least important of all the factors to be considered in bread making. But a loaf of bread is not perfect if irregular in form. If two loaves were equally good in all particulars except the form, one of which was regular and the other irregular, the regular one would be scored the higher. Slices cut from a regular loaf of bread are more attractive than those cut from an irregular one. Rectangular loaves are preferred to round ones because the slices are more uniform.



SMALL SINGLE LOAVES OF BREAD

SCORE CARD FOR BREAD

The score card which follows is a tentative one. It is presented by the Home Economics Department of the State University with the hope that it may be of help to the bread judges in the cooking contests held throughout the state.

SCORE CARD

Flavor	
Taste, Odor	45
Texture of Crumb	
Lightness, Doughiness, Color, Moisture	40
Texture of Crust	
Color, Hardness	10
Size and Form	5
Total	100

METHODS OF MAKING BREAD

The simplest form of nutritious, appetizing bread may be made by adding yeast with a little salt to a mixture of warm water and flour and treating according to directions given below. For most people the flavor is improved if to the above mixture a little sugar and shortening be added. The nutritive value of bread is increased and likewise it is made more pleasing to the tastes of some people if milk be used instead of water for a portion or all of the wetting. Some housewives think they must have buttermilk in order to make good bread, others consider potatoes or at least the water in which they have been boiled, essential. While these substances change the quality and the flavor of bread, and for many people improve it, nevertheless it is true that palatable nutritious bread can be made by the simplest method, as indicated above.

Many people scald a portion of the flour and cool it to the desired temperature with cold milk or water before adding the yeast. It is claimed that scalding the flour makes the bread

more moist. The same claim is made for the addition of potatoes and buttermilk. The boiling water bursts the starch granules making them more soluble and ready to be transformed into glucose from which the gas is produced.

There are two general methods of mixing the materials in bread making. One is to add nearly all the flour directly after putting in the yeast, making a stiff loaf and kneading it before it begins to rise. The second method is to add at first with the yeast only a portion of the flour making a comparatively thin mixture called the sponge. This is left in a warm place until it is full of holes, a veritable sponge, then it is stirred down, the remainder of the flour added and the mass kneaded thoroly and left to rise. After it is light it is formed into loaves again left to rise until it doubles its volume and then baked. The yeast grows more rapidly in the thin mixture than in the stiff. The sponge therefore becomes light sooner than the stiff loaf. Some contend that the second method gives the better flavor, others hold that it is less work to mix the flour all in at once and therefore prefer the first method. There is as yet much difference of opinion even among good breadmakers as to which is the better method.

AMOUNT OF MATERIALS

In general the proportion of liquid to flour is as 1 to 3 but this proportion varies according to the nature of the flour. The hard spring wheats from which so-called bread flour is made are rich in gluten and therefore absorb more water than the pastry flour which is made from soft winter wheat and is poor in gluten. Therefore less flour is required for a given amount of liquid if bread flour is used and more if pastry flour.

The amount of yeast to be used in making a given quantity of bread depends on the time to be consumed in the making of the bread. In the schools where it is not convenient to let it rise over night and where the entire process must be finished in the least possible time, larger amounts of yeast are used than should be used in the home where the time element is not so important a factor. If the bread is to stand over night one fourth cake of compressed yeast or one half cake yeast foam, to two cups of

liquid, under favorable conditions, give good results. With this amount of liquid two loaves of bread can be made. If it be desirable to complete the process in a very short time the amount of yeast may be doubled without any disagreeable flavor appearing in the bread.

The amount of salt, sugar and shortening to be used depends much upon the individual taste. Excellent bread is made by using two tablespoons of shortening, two tablespoons sugar, two teaspoons salt to two cups of liquid.

If the above general statements be summarized briefly in the form of a recipe it would be as follows:

RECIPE FOR WHITE BREAD

2 cups water.
6 cups flour.
2 tablespoons shortening
2 teaspoons salt
2 tablespoons sugar.
½ cake yeast foam or ¼ cake compressed yeast.

Put the yeast to soak in ¼ cup warm water, to half the flour add the salt, sugar and shortening. Into the mixture pour one cup boiling water. Stir thoroly. Cool with ¾ cup cold water. When the temperature is reduced to 90° F. or when it feels warm, not hot, add the yeast which has been softened in the ¼ cup water. Stir until well mixed then cover and put in a warm place. If possible keep the temperature between 70°—90° F. When the mixture is light and full of gas bubbles, stir in the remainder of the flour, more or less, until it is stiff enough to work with the hands. Then take it out on the bread board and knead until the mass is of a uniform consistency and is smooth and elastic to the touch.

Enough flour must be added while kneading to keep the dough from sticking but care should be taken not to add too much as there is danger of making the dough too stiff and the bread dry. Put the dough well covered in a warm place and leave until it doubles its volume. Shape into loaves, place in greased pans, cover and let it again double its volume, then bake in a hot oven from 45 to 60 minutes. If the loaves are allowed to rise too long before baking so much gas is produced that some of the holes become large and sometimes the pressure due to the increase and expansion of the gas is so great that the gluten wall is broken, the gas escapes

and the bread falls. Besides this, acid fermentation is likely to begin when bread is left too long and a sour taste is the result.

Care must be taken not to have the oven hot enough to burn the bread. The heat should be reduced during the latter part of the baking. Bread should be thoroly baked.

FURTHER WORK

After a young woman has had sufficient practice to get uniformly good results from the above recipe she will be ready to make some experiments in modifying it, by use of milk, buttermilk, potatoes, etc. She will also have developed sufficient judgment to be able to compare different methods and determine which is the best. There is an immense amount of intensely interesting work for young women to do along this line.

It is hoped that through the work of the Girls' Domestic Science Associations and Clubs much may be done to improve the quality of bread used in Nebraska. Doubtless, the per cent of homes in which excellent bread is served is high, nevertheless the quantity of heavy, doughy, or sour bread consumed in Nebraska is unfortunately much greater than is good for the digestion of the people or conducive to their happiness.

With this purpose in view the managers of the state Domestic Science Association propose this year to turn the attention of young women to bread making. In the state contest the largest prizes will be offered for white bread. In this contest corn bread is the only other class of foods which will have a place.

Prizes will be offered for the best hand-made and the best machine-made apron.

The variety of articles to be entered at the state contest, has been thus greatly reduced, because it is thought that more will be accomplished by concentrating effort upon a few things than by dividing time and attention among a larger number.

SUGGESTIONS FOR COUNTY EXHIBITS

1. All entries should be accurately recorded in a book provided for the purpose.

2. In this book there should be recorded, beside the number of the entry and the name and P. O. address of the person making the entry, the name of the article and the class to which it belongs.

3. Plenty of room should be provided to arrange the exbibit advantageously. If the tables be covered with paper the attractiveness of the exhibit is increased. White paper is generally preferred. The articles should not be crowded together, neither should there be wide spaces between them. They should be so arranged as to make the most attractive appearance possible. No scraps or crumbs should be left lying about and everything should be neat and clean.

4. Every article entered in the exhibit should be labeled. On the label should be written the name of the class and the corresponding entry number recorded in the book. These labels should be so securely fastened to the articles that they will not be easily brushed aside and lost.

5. Articles of the same class should be placed together. In other words there should be one place for the white bread and another for the corn bread.

6. Aprons may sometimes be displayed advantageously on the wall or sides of a booth. If there be colored garments, arrange them so that the colors will harmonize. There are some colors so inharmonious that they are said to quarrel with each other. White should be placed between such colors.

QUESTIONS TO ASSIST PERSONS AND CLUBS IN THE STUDY OF FOOD PROBLEMS

1. Discuss the relation of food to health. What has been accomplished by the study of stock feeding? Is it worth while for women to know as much about human feeding as men know about stock feeding? Why? Give a brief summary of the systematic study of foods. See Farmers' Bul. 142, p. 15.

2. Why should people drink plenty of water? How may a sufficient amount of mineral matter be secured in the diet? What results follow if too little mineral matter be provided? Of what use is sugar and starch in food? What purposes do fats serve? What is the function of nitrogenous food substances and why are they called proteids? State in what foods each of the food principles may be found. What are the relative proportions in which the food principles should be used? What is meant by balanced rations? Prepare a bill of fare which shall provide balanced rations. How are rations likely to become unbalanced? 1st, if the outlay be reduced to a minimum: 2d, if a great abundance of rich and attractive food be supplied?

3. Compare the human body to a steam engine stating in what respects it resembles and how it differs from the engine. See Farmers' Bul. 142, p. 8. Upon what does the value of food for nutriment depend? Farmers' Bul. 142, p. 15. Compare foods with respect to the relative market value of their nutritive ingredients. See Farmers' Bul. 142, pp. 39-44.

4. Compare cereals with other food producing plants as to general characteristics and value of food material. Compare cereals with each other as to fat and proteid content.

5. Discuss the production of cereals in U. S. How does Nebraska compare with other states in the production of cereals?

6. Classify breakfast foods as to origin and also as to method of manufacture. What has been the effect of the extensive introduction of breakfast foods? Should their use be encouraged or discouraged? Why? Considered from a money point of view how do cereals compare with other classes of food in supplying di-

gestible nutrients? Farmers' Bul. 249, p. 30. Do you consider their use economical or extravagant?

7. Give reasons for cooking food. What principles should be observed in cooking?

8. How does cooking render cereals more digestible? What kinds of cereals require long cooking? Why? Why may rice be cooked in a comparatively short time? Make a list of cereals arranging them according to the amounts of digestible nutrients they contain, putting the richest first; the next in value second, and so on.

9. Compare oatmeal cooked one half hour with that cooked three hours. Which has the better flavor? Give different methods of preparing cereals for the table. Give the names of cereals used in your home. Name others not used.

10. What are the advantages of the double boiler? Devise and describe a substitute to be used in homes where double boilers are not available.

11. Make a fireless cooker and try cooking in it cereals, also other foods. Report your results to your club, also to the Home Economics Department of the University.

12. Compare the different recipes you have used in making corn bread and state which give the best results. Make a list of the different foods you have prepared from corn and give directions for the preparation of each.

13. What are the general methods of making bread light? Discuss the action of yeast as a leavening agent, in the following order (a) describe the plants, (b) what do they require for nourishment, (c) what conditions are favorable to their growth, (d) how do they affect the glucose (e) what gas is formed and what purpose does it serve in bread making? What forms of yeast have you used, and which do you prefer?

14. Prepare some gluten by washing the starch out of a piece of dough. Describe the gluten and explain what purpose it serves in the production of white bread. Why is it necessary to knead the dough?

15. Have you ever used a bread mixer? If so give your opinion as to whether satisfactory results may be secured with it.

16. In the baking of bread what changes are brought about in the dough by the heat?

17. What do you consider the requisites of good bread? Explain fully.

18. Give in full your method of making bread. Have you ever tried another method? If so tell what it is and explain why you prefer your own method.

REFERENCES HELPFUL IN THE STUDY OF FOOD PROBLEMS

[1]Principles of Nutrition and Nutritive Value of Food by W. O. Atwater,. Farmers' Bul. 142, U. S. Dept. of Agr.

[2]Bul. 28 (revised) U. S. Dept. Agr. Office of Experiment Stations.

[3]Cereal Breakfast Foods. Bul. 84 Agr. Exp. Sta. Orono, Maine.

[1]Cereal Breakfast Foods by Charles D. Woods and Harry Snyder, Farmers' Bul. 249, U. S. Dept. of Agr.

[2]Studies on Bread and Bread Making by Harry Snyder and L. A. Voorhees, Bul. 67, U. S. Dept. Agr. Office of Experiment Stations.

[1]Bread and the Principles of Bread Making. bv Helen W. Atwater, Farmers' Bul. 112, U. S. Dept. of Agr.

Fireless cook stoves by G. H. Murphy, Sci. Am. 95. 208-9 S. 22. '06.

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Hay Cooker. Reading Course for Farmers' Wives. Series 5, No. 23 p. 446.

Fireless Cooker. Principles of Cookery by Anna Barrows, pp. 12-13, 152.

The Fireless Cooker. Amer. Agr., 79 (1907) No. 1, p. 27.

Fireless Cooking by H. G. Sharpe, Rpt. Commis. Gen. (U. S. Army) 1906 pp. 14-18.

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[1] May be obtained free by writing U. S. Dept. of Agr. Washington, D. C.

[2] May be obtained by writing U. S. Dept. of Agr. office of Exp. Sta., Washington, D. C.

[3] May be obtained by writing Agr. Exp. Sta., Orono, Maine.